MATHEMATICAL CONNECTION ABILITY JUNIOR HIGH SCHOOL STUDENTS IN MATHEMATICS PROBLEM SOLVING

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Abstract
The purpose of this research was to determine the description of mathematical connections abilities on junior high school students grade VIII in mathematics problem solving. Subject retrieval is done by purposive sampling. The method used is a descriptive qualitative. The data collected is the result of students' written work. The results showed that the four indicators of mathematical connection ability of students in mathematics problem solving are fulfilled so that mathematics is an integral part of daily life that is inseparable.

Keywords:*Mathematical connection ability, Mathematics problem solving*

1 INTRODUCTION

Mathematics is a basic science that is useful for human life such as mathematics underpinning the development of modern technology, mathematics has an important role in various disciplines. In addition, with mathematics can advance the human mind power and even the daily human activities can not be separated from mathematics. The objectives of mathematics learning set out in the 2006 curriculum issued by National Education Department of Indonesia basically include (1) the connection between concepts in mathematics and their use in solving problems, (2) reasoning, (3) problem solving, (4) communication and representation, and (5) affective factors.Mathematics learning requires students to have good mathematical connection ability in order to be able to solve all math problems. Teachers as learning managers must be active as well as creative in managing learning. In the process of learning, teachers are expected to be able to create an active learning atmosphere involving students. A good teaching philosophy is not just transferring knowledge to students, but how to help students to learn. (Ali: 2009).

Mathematical problem solving enables students to be more critical and creative in making decisions in their lives. Learning problem solving refers to the mental process of an individual in facing a problem to further discover how to solve that problem through a systematic and careful thought process. Problem solving skills do not develop within few weeks or months and it is also not a topic that is thought in special class level. Development for the problem solving skill is slow and progressive. Problem solving should be expressed every day, in every lesson and should continue from the beginning of the preschool until high school, because learning of mathematics and problem solving are related to each other (Dilek, Lynn, &Recai: 2012). Problem solving is a complex mental process, involving visualization, imagination, abstraction, and assosiation of information (Abdul & Ansari: 2016).

The material mastery in solving mathematic problem much needs mathematical connection ability of the students. The ability of a mathematical connection is an essential skill that must be mastered by high school students. The importance of possessing mathematical

connection ability is in line with the nature of mathematics as a systematic and structured science which contains interrelated concepts. Mathematical connection ability is ability to connect inter-concepts in mathematics and connect mathematics concept and non-mathematics concept. Mathematics is not partitioned in separated various topics, but this is a unity. Mathematics can't be separated from other science and problem of everyday life (NCTM, 2000:275).

Mathematics learning demands students' understanding of connections between mathematical concepts or ideas that facilitate their ability to formulate and verify conjectures inductively and deductively. Furthermore, newly developed mathematical concepts, ideas and procedures can be applied to solve other problems in mathematics or other disciplines (YantodanUtari, 2007). The result of Sugiman's research (2008) shows that the students' mathematical connection ability level only reaches 53.8%. This achievement is categorized low. The average percentage of mastery for every aspect of the connection is the interconnection of mathematics topics 63%, between math topics 41%, mathematics with other lessons 56%, and mathematics with life 55%.

The connection ability needs to be trained to high school students. If students are able to associate mathematical ideas then their mathematical understanding will deepen and last longer as they are able to see the interrelationships between topics in mathematics, with contexts other than mathematics, and with the experience of everyday life. (NCTM, 2000: 64). Mathematical connection becomes more important asit supportsstudents to comprehend a concept substantially and assists them to improve their understanding on other diciplines through interrelationshipbetween concepts of mathematics andconcepts of other diciplines(Heris, Ujang, & Utari: 20014).

2 THEORETICAL REVIEW

Mathematics is a science that does not stand alone, it means that mathematics is an integral unity both between topics in mathematics and its relationship with other science. This shows that in mathematics there is a connection called a mathematical connection.Mathematical connection is one of the main focus of mathematics learning objectives set out in the 2006 Curriculum.

Mathematical connection was described by Hiebert and Carpenter (1992) as part of the network is structured like a spider web, "The junctures, or nodes, can be thought of as pieces of represented information, and threads between them as the connections or relationships". (J. Hiebert and T. P. Carpenter: 1992).

The ability of a mathematical connection is the ability to connect between concepts in mathematics and relate mathematical concepts and non-mathematical concepts. Mathematics is not partitioned on a variety of separate topics, but it is a unity. Mathematics can not be separated from science and other everyday life issues (NCTM, 2000: 275).

Mathematical connection ability also interacts with the process of understanding the other, especially in the problem solving process. Problem solving is a complex mental process, involving visualization, imagination, abstraction, and assosiation of information. (Abdul & Ansari: 2016). Problem solving is a mental process and requires a high level of more complex thought processes including reasoning (D. Haryani: 2012).

In mathematical connection ability, students are required (1) to connect inter-topics in mathematics that connect inter-concept or principle in the same topic, (2) connection between topics in mathematics that connect one material and other materials in mathematics, (3) connection between mathematics materials and other science, (4) connection between mathematics and everyday life which can be found by students (NCTM, 2000:64).

3 RESEARCH METHODS

The research is a qualitative research with descriptive design. Descriptive is a collection of data in the form of words, pictures and does not contain the number in it (L.J. Moleong: 2012). Subjects were 3 students of grade VIII they are students who can solve problems and have mathematical connection ability. Subject retrieval is done by purposive sampling and snowball sampling (Sugiyono: 2014). The instrument used consisted of the main instruments and supporting instruments. The main instrument is the researchers themselves, while supporting instruments is question or problem test.

4 RESULTS AND DISCUSSION

In this research the researchers choose three subjects based on test results at an early stage. The data collected is the result of student written test. This data will become a measurement to deduce how the Mathematical connection ability in solving mathematical problems in grade VIII junior high school level.Giving material on the subject is done after school hours. The material tested are 4 mathematical connection problems with the material of geometry. Below is the result of student's answer that I use in this research.

1. To connect inter-topics in mathematics that connect inter-concept or principle in the same topic.

   The volume of a beam is 5 times the volume of the cube. Cube ribs are 10cm. What is the volume of the beam?
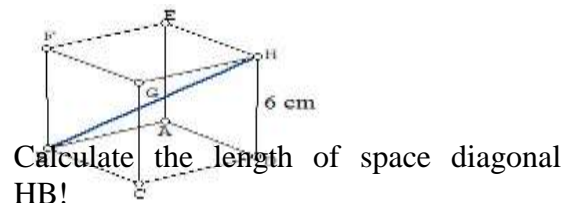

   Based on the above answers the subject has been to connect the concept in

geometry that is the volume of cubes and beams.

2. Connection between topics in mathematics that connect one material and other materials in mathematics.
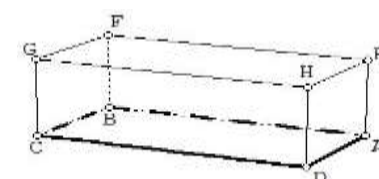
   Look at the picture below!

   Calculate the length of space diagonal HB!

   Based on the above answers the subject has been able to connect between topics in mathematics that is the topic of geometry with pythagoras. The subject's answer indicates that to calculate the diagonal space of the cube using the pythagoras formula.

3. Connection between mathematics materials and other science.

   Look at the following picture!

   Known beam with a length of 1.5 m is located on the table. The force on the table is 450 Newton. The pressure on the base of the beam is 300 Pascal. Determine the width of the beam! (P = F / A)

Based on the above answer, the subject has been able to connect mathematical material with physics ie acceleration (P) is the result of comparison between force (F) and the base area (A).So that the width of the beam can be obtained by first looking for the base area (A).

4. Connection between mathematics and everyday life which can be found by students.

   Dodo will give a birthday present to Tina, the gift is put into a box in the shape of a beam that is 60 cm long, 20 cm wide and 40 cm high.In order to appear attractive, the gift box will be wrapped with wrapping paper that has an area of $3500 cm^2$. In order the wrapping paper to be bought is not less, what should Dodo do?

Based on the above answer, the subject has been able to connect between mathematics and everyday life that is to find the number of wrapping paper needed, using the formula of rectangular area. That means to be able to solve this problem, it takes a broad concept in geometry.

From the above it can be concluded that the Mathematical Connection Ability is done by students in solving mathematical problems.The results of the research showed that the four indicators of mathematical connection ability of students in mathematics problem solving are fulfilled.

This shows that mathematics is a science that does not stand alone. Mathematical connection ability is ability to connect inter-concepts in mathematics and connect mathematics concept and non-mathematics concept.

5 CONCLUSION

The results showed that the four indicators of mathematical connection ability of students in mathematics problem solving are fulfilled so that mathematics is an integral part of daily life that is inseparable.

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